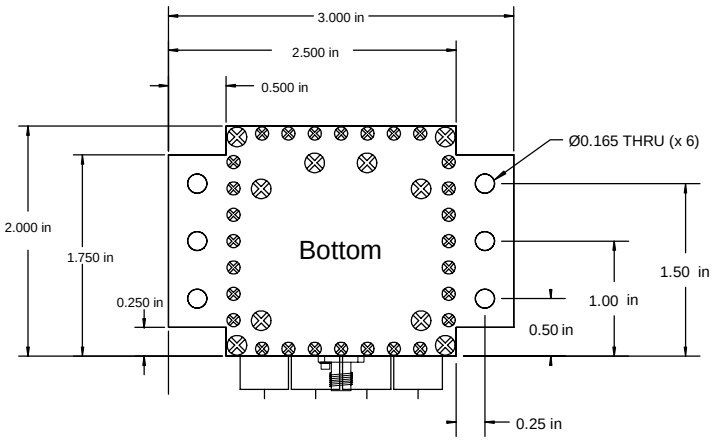
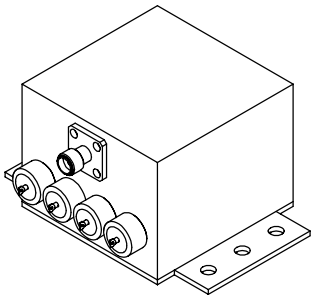
Military & Space > 90 to 550 MHz > VHF Space Qualified Crystal Oscillator (OCXO)

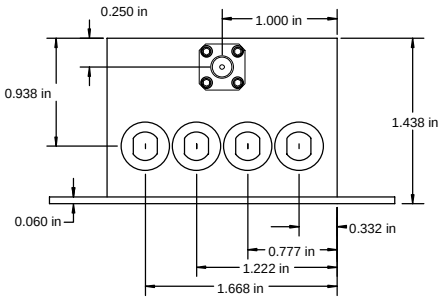
- **MIL-PRF-55310 S-Level Process Flow**
- **High Reliability VHF Ovenized Oscillator for Space**
- **Level 1 and Level 2 Models Available**
- **Radiation Hardness to 100 krads Standard, higher levels upon request**
- **Custom Specifications Readily Available**

The Space Qualified Crystal Oscillator is a small ovenized VHF oscillator, which incorporates a Z-swept, premium Q, synthetic resonator per MIL-PRF-3098. The unit operates at a fixed frequency between 90 and 550 MHz and uses space qualified semiconductors, passives, and ICs.

The unit exhibits excellent aging rates of 5×10^{-9}/day and 1×10^{-6}/year for extended mission life. The low phase noise performance is derived from designs that have made Wenzel a leading manufacturer of commercial, military, and space oscillators. This oscillator can be built and screened to MIL-PRF-55310 (Class 1) Product level S or B, or to EEE-INST-002 levels 1, 2 or 3.







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General Requirements

Material, Design and Construction	MIL-PRF-55310
Parts and Materials List	Supplied
Parts, Materials	EEE-INST-002 Level 2 at a minimum, JANS Semiconductors, Established Reliability Passives and space quality ICs, when available.
Crystal	30 to 110 MHz (fixed, please specify), premium Q, Z-swept, synthetic quartz
Outgassing	TML<1% and CVCM <0.1% per
Traceability	Serial number, lot and date code tracking
De-rating	per EEE-INST-002, (JPL-D-8545, alternative)
Soldering	J-STD-001 class 3
Case	Nickel-plated aluminum housing
Finish	Electroless nickel per AMS 2404 (MIL-C-26074)

Electrical Performance

RF Output Frequency	90 to 550 MHz (fixed, please specify), sine wave
Frequency Accuracy (initial)	$\pm 2 \times 10^{-8}$ at +25°C
Frequency Stability	$\pm 1 \times 10^{-7}$ for -10°C to +50°C (ref +25°C)
Aging Rate (after 90 days operating)	
1 day	$\pm 2 \times 10^{-9}$
1 month	$\pm 5 \times 10^{-8}$
RF Output Power	+13 dBm ±1.5 dB into 50Ω
RF Output Harmonics	<-30 dBc
RF Output Sub-harmonics	<-40 dBc
RF Output Spurious	<-100 dBc, 100 KHz to 1 GHz

Phase Noise Static	(100 MHz)	(300 MHz)	(500 MHz)
10 Hz	-100 dBc/Hz	-88 dBc/Hz	-85 dBc/Hz
100 Hz	-130 dBc/Hz	-118 dBc/Hz	-115 dBc/Hz
1 KHz	-150 dBc/Hz	-138 dBc/Hz	-135 dBc/Hz
10 KHz	-165 dBc/Hz	-153 dBc/Hz	-150 dBc/Hz

Supply voltage	+15 VDC ±5%
Warm-up power	<7 watts
Warm-up time	<20 minutes at ambient pressure <5 x 10^{-5} torr
Input power	<4 watts steady state at ambient pressure <5 x 10^{-5} torr

Environmental Conditions

Operating temperature	-10°C to +50°C
Storage temperature	-40°C to +105°C
Ambient pressure	Atmospheric (760 torr), Vacuum (<5 x 10^{-5} torr)
Radiation, design to meet	TID 100 krads Si

Mechanical Specifications

Size	3" x 2" x 1.438"
Weight	<300 grams, max.
Physical	Non-hermetic, vented enclosure

Model Definitions

EM (Engineering Model)	Design and Construction similar in appearance and identical in form, fit, and function to FM. Developed using best commercial practice, including commercial parts and materials. EM shall be subjected only to electrical tests, with no environmental testing performed.
FM (Flight Model)	Fabricated to meet all design, construction, and test requirements. FM shall be subjected to the entire compliment of electrical and environmental acceptance tests.

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QUALIFICATION TESTS (Non-flight model, only)

Group I (6 samples)	Visual, Electrical Tests*
Burn-In (operational)	240 hours minimum at +60°C
Group II (6 samples)	
Aging	30 Days
Group III Subgroup 1 (6 samples)	
Random Vibration	11.95 Grms, MIL-STD-202, method 214 I-D, 50 to 2000 Hz, 5 min per axis
Shock	MIL-STD-202, Method 213, Condition A, 50G, 11msec
Group III Subgroup 2 (3 samples)	
Thermal Shock	MIL-STD-202, Method 107, Condition A-1, 25 cycles, -55°C to +85°C
Ambient Pressure	MIL-STD-202, Method 105, at <5 x 10^{-5} torr
Group III Subgroup 3 (1 sample)	
Resistance to Soldering Heat	MIL-STD-202, Method 210, Condition A
Group III Subgroup 4 (1 sample)	
Terminal Strength	MIL-STD-202, Method 211, Condition C, Not applicable for pins <0.25"
Solderability	MIL-STD-202, Method 208
Resistance to Solvents	MIL-STD-202, Method 215 Not applicable when marking is electro-etched
Electrical Tests*	
Radiographics	MIL-STD-202, method 209

ACCEPTANCE TESTS (Flight Model)

Electrical Tests*	
Thermal Shock	MIL-STD-202, Method 107, Condition A, 5 Cycles, -55°C to +85°C
Random Vibration (non-operational)	7.56 Grms overall, 50 to 2000 Method 214 I-B, 50 to 2000 Hz, 5 min per axis
Electrical Tests*	
Burn-In (operational)	240 hours minimum at +50°C
Aging Rate	Projected after 30 days operating
Electrical Tests*	
Radiographics	MIL-STD-202, method 209

***ELECTRICAL TESTS**

Tested at ambient pressure <5 x 10^{-5} torr and at -10, +25, and +50°C unless otherwise noted

Warm-Up Power (-10°C only)
Warm-Up Time (-10°C only)
Input Power
Cold Start (-10°C)
Hot Start (+50°C)
RF Output Power
RF Output Harmonics
RF Output Spurious
Frequency Accuracy (+25°C only)
Frequency Stability
Phase Noise - Static (+25°C only, 760 torr)

ANALYSES

Thermal Analysis, Component Stress Analysis

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